

Free World
Economics

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*The International Energy Situation:
Outlook to 1985*

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SUMMARY

In the absence of greatly increased energy conservation, projected world demand for oil will approach productive capacity by the early 1980s and substantially exceed capacity by 1985. In these circumstances, prices will rise sharply to ration available supplies no matter what Saudi Arabia does. Although our forecast of oil demand broadly resembles other official and private forecasts, we are more pessimistic about the implication. This pessimism is largely based on (a) our estimate that the USSR will change from an exporter to a substantial importer of oil, and (b) our examination of the supply capabilities of OPEC and non-OPEC countries.

The underlying supply problem will be masked during the next few years because of greatly increased oil production from the North Sea and Alaska. Given this new production, demand for OPEC oil should stabilize at near current levels through 1979. Saudi excess capacity will be increasing during this period, allowing Riyadh to hold down oil prices in spite of upward pressure from other OPEC states. Since this will be a political decision on the part of the Saudis, they could reverse it at any time for political reasons.

Between 1979 and 1985, increasing world demand and stagnating oil production in the major consuming countries will result in increased reliance on OPEC oil. By 1985 we estimate that demand for OPEC oil will reach 47 to 51 million b/d. Even if all other OPEC states produce at capacity, Saudi Arabia will be required to produce between 19 and 23 million b/d if demand is to be met. This is well above present Saudi capacity of 10 to 11 million b/d, and projected 1985 capacity of at most 18 million b/d. With the present expansion plans of the Saudis, their excess productive capacity will be exhausted by 1983, and with it their ability to act as a price moderator in OPEC.

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Although Saudi Arabia has the reserve potential to meet increased demand between now and 1985, we doubt the Saudis will be able, or willing, to do so. Existing plans to expand productive capacity are already falling behind schedule and will probably continue to do so in the future. Riyadh is already committed to an ambitious industrialization program which is stretching management, labor supply, and logistic capabilities extremely thin. The Saudis would prefer a production level of between 8 and 10 million b/d, and if they produce more, it will be as a favor to the West.

Alternative oil supplies are not likely to come on stream rapidly enough to significantly alter the situation. By 1980, growth in North Sea supplies will be slowing, Alaskan output will have stabilized, and the USSR will be losing its status as a net oil exporter to the West. We estimate that in 1985 the USSR and Eastern Europe will be net importers of 3.5 to 4.5 million b/d. While Mexico and Egypt will probably have emerged as substantial oil producers by the mid-1980s, their increased production will put only a small dent in demand for OPEC oil.

Non-oil energy supplies cannot be counted on to appreciably relieve the problem between now and 1985 either. Given the long lead times required, we do not see nuclear powerplants contributing more than 6 million b/d of oil equivalent to new fuel supplies by 1985. If the pattern of delays in nuclear plant construction in the major countries continues, only one-half this amount may be added. Natural gas supplies outside OPEC will increase little during the period. Increased output in the North Sea will probably be offset by declines in the US and Canada. Coal production will expand in the US, but not in most other Free World countries.

**The International
Energy Situation:
Outlook to 1985**

Introduction

This report examines the pattern of world oil demand and supply between now and 1985. For major consuming countries we have estimated total energy demand basically drawing on two factors (a) rates of economic growth and (b) the effect of conservation measures now in place. We do not, however, attempt to estimate the impact on demand of future policy changes regarding conservation. Demand for oil in other consuming areas was determined on the basis of projected economic growth rates. For each region total demand for oil was then determined by estimating the size of non-oil energy supplies. Separate estimates of non-OPEC oil supplies were made to determine demand for OPEC oil. Our supply estimates are based on a detailed analyses of such factors as government exploration and development policy, adequacy of the energy reserve base, existing contracts, and the lead time necessary to bring projects on line.

OECD Demand for Energy

Economic Growth and Conservation

Between now and 1985 economic growth is likely to be slower than during the decade prior to 1973. In part, this reflects balance-of-payments constraints and the lingering effects on demand of the sharp rise in oil prices during 1973-74. Slow growth has brought about major social and political problems for Free World countries. As unemployment is very high by recent standards, the political leadership of most countries is under pressure to stimulate economic growth and employment. The growth rates chosen through 1985 take into consideration both external pressures retarding growth and political forces urging more rapid economic expansion (table 1).

These growth rates are slower than the long-term projections employed by the OECD—a 4- to 5-percent rate for the United States, a 3- to 3.5-percent rate for OECD Europe, and a 6-percent rate for Japan. The growth pattern of Canada is consistent with that of the United States, reflecting the close economic links between the two.

Table 1

Economic Growth Rates
Major Developed Countries

	Percent					
	Actual	Projected				
	1976	1977	1978	1979	1980	1981-85
United States	6.1	5.0	5.0	4.5	4.5	4.0
OECD Europe	4.1	3.0	3.0	3.0	3.0	3.5
Japan	6.0	6.5	6.0	6.0	6.0	6.0
Canada	4.8	4.0	4.0	4.5	4.5	4.5

Before 1973 the relationship between energy demand and real GNP was very stable, reflecting the close connection between energy consumption and the stock of energy-consuming capital. Given this relationship, we found that the best predictor of energy demand prior to 1973 was a 4-year weighted moving average of GNP.¹ The relationship—derived separately for each of the major energy-consuming areas (the United States, OECD Europe, Japan, and Canada)—was used to determine a baseline of energy demand through 1985. This base demand was then reduced to take account of projected energy savings from higher prices and conservation measures already introduced.

Determining savings from conservation is extremely difficult; since 1973, energy economists have attempted with little success to quantify these savings. Early

1. The representation of economic activity we have used is a "smoothed" time series of GNP in each of the four regional groups. The smoothed GNP value (SGNP) in each year is a 4-year weighted moving average, as follows:

$$SGNP = \frac{aGNP + a^2GNP(-1) + a^3GNP(-2) + a^4GNP(-3)}{a + a^2 + a^3 + a^4}$$

The value of a was chosen such that the selection gave the best fit over the historical period. Given the smoothed GNP series, we postulated that under "normal" circumstances, energy demand (ED) grew in proportion to SGNP, that is,

$$ED = ED(-1)((x(SGNP/SGNP(-1)-1)+1))$$

and that x had a value close to one. To test this assumption, least squares regressions were run on data for the period 1956-73 to estimate the proportionality factor (which can loosely be termed a "constant income elasticity") for each of the four major regions. In all cases, the value of x was close to unity, as expected. Moreover, each equation fits the historical period very well, with r^2 values of at least 0.99.

estimates tended to overestimate the impact of price-induced conservation, in part because of difficulty in separating that portion of the drop in energy demand resulting from recession from the portion attributable to conservation. More recent estimates may have erred in the opposite direction, understating energy savings from conservation. We assume that, during the next 15 years, energy savings relative to the baseline forecast will range from 10 to 15 percent in the United States and from 5 to 10 percent in Japan and Western Europe. These estimates are appreciably higher than those implied in demand estimates prepared by the IEA Secretariat.

The Demand Forecast

Our calculations indicate that total OECD² energy demand will approach 85 million b/d oil equivalent in 1980, rising to about 100 million b/d in 1985.³ The 1985 demand is about 40 million b/d lower than what it would have been had the oil crisis of 1973-74 not happened. About 30 million b/d of this reduction is due to the slower economic growth now envisioned; the remaining 10 million is due to price effects and conservation. Even with these shifts, total OECD energy demand would be about 15 percent higher in 1980 than last year; by 1985 it would be nearly 40 percent higher (figure 1).

The United States accounts for about 45 percent of the growth in OECD demand between now and 1985. This occurs despite the relatively large energy savings—5 to 7 million b/d oil equivalent by 1985—we have incorporated into the US estimate (table 2). As much as 2.5 million b/d of this savings reflects the impact of higher gasoline mileage standards already mandated. The remainder would have to come from modifications in lifestyle and changes in capital stock (either retrofit or new). Achieving these savings would require a sharp increase in the energy efficiency of new capital. Rough calculations suggest that new capital installed during 1977-85 must be 15 to 20 percent more energy efficient than the existing capital stock.

West European energy consumption is projected to reach 27 to 28 million b/d oil equivalent by 1980 and at least 32 million b/d by 1985. This estimate

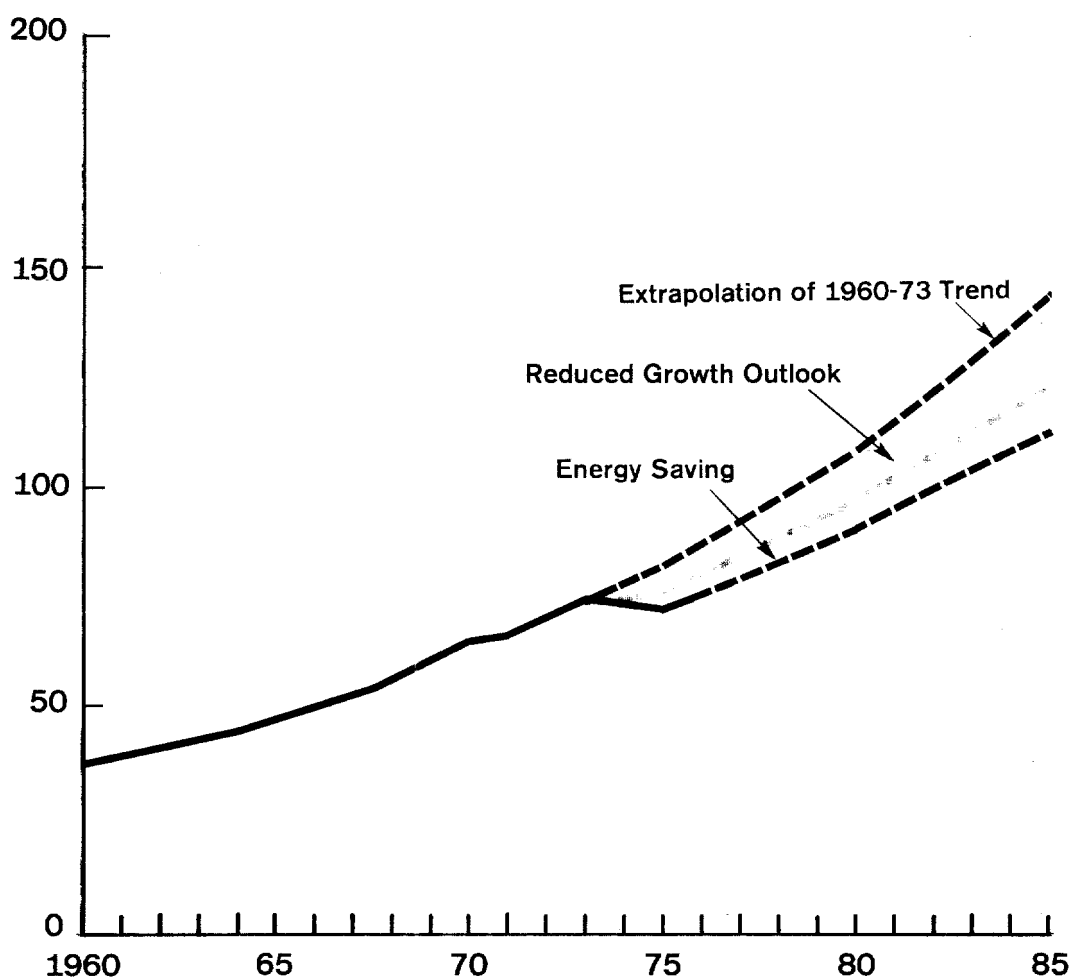
2. Throughout this discussion, OECD refers to all member countries except Australia and New Zealand, that is, the United States, the 19 OECD member countries of Western Europe, Japan, and Canada.

3. All projections of energy demand and supply in this paper are constructed from ranges that encompass the best estimates for each component under review. As it is highly unlikely that all high-side estimates or all low-side estimates will occur simultaneously, we view each range as plus or minus one standard deviation. To construct ranges for supply and demand aggregates, we use a statistical principle that the variance of a sum of independently distributed random variables is equal to the sum of the variances.

OECD Energy Demand¹

Million b/d Oil Equivalent

Figure 1



¹Excluding Australia and New Zealand.

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Table 2

Energy Demand Projections
OECD Countries

	Million b/d Oil Equivalent					
	1976	1977	1978	1979	1980	1985
Total						
1960-73 trend	86.0	90.7	95.8	101.1	106.9	142.0
Adjusted for reduced growth	76.9	80.1	83.5	87.1	90.7	111.1
Adjusted for conservation	72.8	75.7-76.2	78.1-78.9	80.8-81.8	83.5-84.9	99.3-102.1
United States						
1960-73 trend	42.5	44.3	46.2	48.2	50.3	61.9
Adjusted for reduced growth	38.6	40.3	42.1	44.0	45.8	55.2
Adjusted for conservation	37.2	38.5-38.9	39.6-40.3	40.7-41.6	42.0-43.1	48.2-50.4
OECD Europe						
1960-73 trend	28.8	30.3	31.9	33.6	35.4	46.0
Adjusted for reduced growth	26.0	26.8	27.6	28.5	29.4	35.1
Adjusted for conservation	24.0	25.0-25.3	25.6-26.0	26.3-26.9	27.0-27.8	31.8-33.2
Japan						
1960-73 trend	9.7	10.8	12.0	13.3	14.8	25.3
Adjusted for reduced growth	7.7	8.2	8.7	9.3	9.9	13.5
Adjusted for conservation	7.2	7.5-7.6	7.9-8.1	8.5-8.7	9.0-9.3	12.1-12.7
Canada						
1960-73 trend	5.0	5.3	5.7	6.0	6.4	8.8
Adjusted for reduced growth	4.6	4.8	5.1	5.3	5.6	7.3
Adjusted for conservation	4.4	4.5-4.6	4.7-4.8	4.9-5.0	5.0-5.2	6.3-6.7

incorporates savings of 3 million b/d by 1985. To accomplish this, however, the efficiency of new capital must increase even faster than in the United States. This reflects the fact that the turnover of energy using capital stock will be tempered by the slower rate of economic growth and capital investment we envision for Western Europe between now and 1985. Japanese energy consumption should reach 12 to 13 million b/d oil equivalent by 1985, up from 7.2 million b/d last year. Canadian 1985 demand is put in the range of 6 million b/d.

OECD Energy Supplies

Between 1970 and 1976, OECD domestic energy production⁴ grew only 1 percent annually. In the United States output actually fell as declines in oil and gas more than offset increases in nuclear, hydroelectric, and coal production. Gains in the other OECD countries were small. Nuclear energy output expanded in all

4. For the purposes of this analysis, *domestic energy production* is defined as domestic production of all energy sources plus net imports of natural gas, coal, and electricity.

regions. Natural gas and oil increased in Canada and Western Europe, due mainly to the initiation of North Sea production. Coal output fell substantially in Western Europe.

Between now and 1980, OECD energy production will expand 4 percent annually (figure 2). This reflects a sharp expansion in North Sea oil production and the opening of the Alaskan pipeline. Nuclear power will also be important, although the amount of new capacity is in doubt because of increasing delays due to environmental objections. Total energy production in the United States, OECD Europe, Japan, and Canada is projected to reach 56 million to 57 million b/d oil equivalent by 1980, up from an estimated 47.5 million b/d last year. North Sea and Alaskan oil output account for one-half of the gain and nuclear production for much of the remainder.

Beginning in 1980, growth in OECD energy production will slow dramatically. Output growth could be as low as 1 percent a year, and at best 4 percent a year until 1985, when it will reach 63 million to 66 million b/d oil equivalent. A key uncertainty is the pace at which nuclear power capacity will become available. Our high-side nuclear energy supply estimates count all plants for which orders have been placed or construction begun. Given the experience of the past few years, actual on-line capacity in 1985 could be much lower. For example, only about one-half of the plants expected in 1970 to be on line last year were actually operating. Our low-side estimates of 1985 nuclear capacity roughly assume that this record continues.

Another area of uncertainty is OECD coal production, and our estimates may be too optimistic. For example, we have projected a small increase in West European coal consumption even though coal usage in major West European countries has fallen slightly since 1973. In the United States environmental concerns are slowing both production and consumption. Only a few of the 76 powerplants that the FEA ordered to shift from oil to coal have complied. If this pattern of resistance persists, our estimates of a 40- to 60-percent increase in US coal production and use between now and 1985 will be high. Coal will account for as much as 70 percent of the projected rise in US energy production between 1976 and 1985.

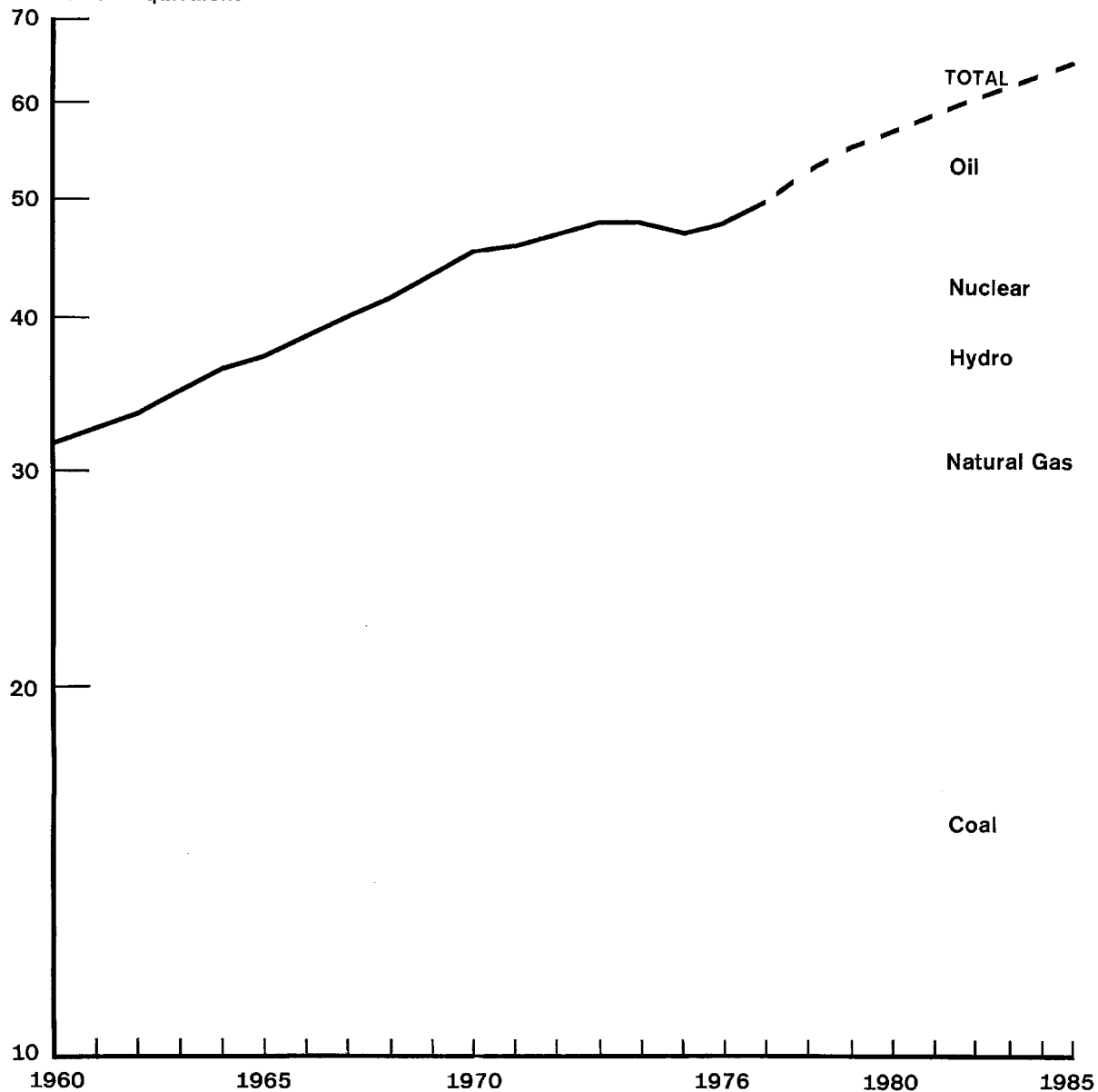
OECD oil production should increase only slightly between 1980 and 1985, at best reaching 17 million b/d by 1985. US production will stabilize at around 10 to 11 million b/d, if tertiary recovery techniques and increased drilling stem the

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Figure 2

OECD Domestic Energy Production¹

Million b/d Oil Equivalent



¹Excluding Australia and New Zealand
1977-85 data plotted from mid-points of ranges.

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Table 3

Domestic Energy Production ¹
OECD Countries ²

	Million b/d Oil Equivalent			
	1970	1976	1980	1985
Total	45.2	47.5	56.0-57.0	63.2-66.1
Oil ³	13.3	12.2	15.2	15.8-17.2
Natural gas	13.6	14.8	15.2-15.6	15.9-16.9
Coal	13.8	14.0	16.5-17.2	18.1-19.6
Hydro/geothermal	4.2	4.6	5.4	6.5
Nuclear	0.3	1.9	3.4-3.8	5.4-7.2
United States	30.8	30.2	32.1-33.0	34.7-37.1
Oil ³	11.3	9.7	10.0	10.0-11.0
Natural gas	11.4	10.3	9.0-9.6	8.5-9.5
Coal	6.7	7.6	9.5-10.2	10.5-12.0
Hydro/geothermal	1.3	1.6	1.7	2.0
Nuclear	0.1	1.0	1.6-1.8	2.5-3.8
OECD Europe	9.4	11.3	16.7-17.1	19.2-20.8
Oil ³	0.5	0.9	3.7	4.0-5.0
Natural gas	1.4	3.3	4.6	5.4
Coal	5.6	4.9	5.1	5.3
Hydro/geothermal	1.7	1.6	2.1	2.4
Nuclear	0.2	0.6	1.2-1.6	1.8-3.0
Japan	1.7	2.0	2.7-2.8	3.9-4.2
Oil	0	0	0	0.1
Natural gas	0.1	0.2	0.5	1.0
Coal	1.2	1.2	1.5	1.8
Hydro/geothermal	0.4	0.4	0.4	0.6
Nuclear	0	0.2	0.3-0.4	0.4-0.7
Canada	3.3	4.0	4.2-4.4	4.5-4.9
Oil ³	1.5	1.6	1.5	1.3-1.5
Natural gas	0.7	1.0	1.0-1.1	1.0-1.2
Coal	0.3	0.3	0.4	0.5
Hydro	0.8	1.0	1.2	1.5
Nuclear	0	0.1	0.1-0.2	0.1-0.3

¹ Defined as domestic production of oil and total domestic consumption of all other fuels.

² Excluding Australia and New Zealand.

³ Including natural gas liquids.

production decline in the lower 48 states. Canadian production should also stabilize, at 1.5 million b/d. The only increase we foresee is about a 1 million b/d gain in OECD Europe's oil production, reflecting North Sea output.

LDC Demand for Oil

As a group, the other industrial countries (such as Australia and New Zealand) and the non-OPEC LDCs will require substantial amounts of imported oil for the foreseeable future. The projected net oil deficit for non-OPEC LDCs is 2.4 million b/d in 1980, rising to 3 to 4 million b/d by 1985 (figure 3). This estimate assumes that the non-OPEC LDCs as a group achieve real GNP growth of 4.5 percent annually, appreciably below their long-term rate of 5.6 percent.

Domestic oil production in the non-OPEC LDCs is projected to increase from 3.7 million b/d last year to 6.1 million b/d in 1980 and 8 to 9 million b/d in 1985. The largest gains will be in Mexico and Egypt, with smaller increases in Brazil, Tunisia, Oman, Syria, India, and Burma. Production of oil and natural gas liquids in Mexico should rise from 900,000 b/d last year to about 2.2 million b/d in 1980. In 1985 production will range between 3.0 and 4.5 million b/d, depending on development policies. At most, Mexico could produce 5 to 6 million b/d by 1985. Egyptian oil output could reach 700,000 b/d in 1980 and possibly 1 million b/d by 1985.

The prospects for production in the other Free World countries—Australia, Israel, New Zealand, and South Africa—are dim (table 4). Australia, the only major producer among this group, will probably see its oil and natural gas liquids output decline to about 400,000 b/d or less by 1985.

Table 4

Oil Import Projections for Non-OPEC Free World Countries (Excluding OECD Countries)

	Million b/d					
	1976	1977	1978	1979	1980	1985
Oil Demand	7.9	8.3	8.8	9.1	10.0	13.9
Australia/New Zealand	0.7	0.7	0.8	0.8	0.9	1.2
Other developed countries ¹	0.5	0.5	0.5	0.5	0.6	0.7
Non-OPEC LDCs	6.7	7.1	7.5	7.8	8.5	12.0
Oil Supply ²	4.2	4.6	5.1	5.8	6.6	8.4-9.4
Australia/New Zealand	0.5	0.5	0.5	0.5	0.5	0.4
Non-OPEC LDCs	3.7	4.1	4.6	5.3	6.1	8.0-9.0
Oil Imports	3.7	3.7	3.7	3.3	3.4	4.5-5.5
Australia/New Zealand	0.2	0.2	0.3	0.3	0.4	0.8
Other developed countries ¹	0.5	0.5	0.5	0.5	0.6	0.7
Non-OPEC LDCs	3.0	3.0	2.9	2.5	2.4	3.0-4.0

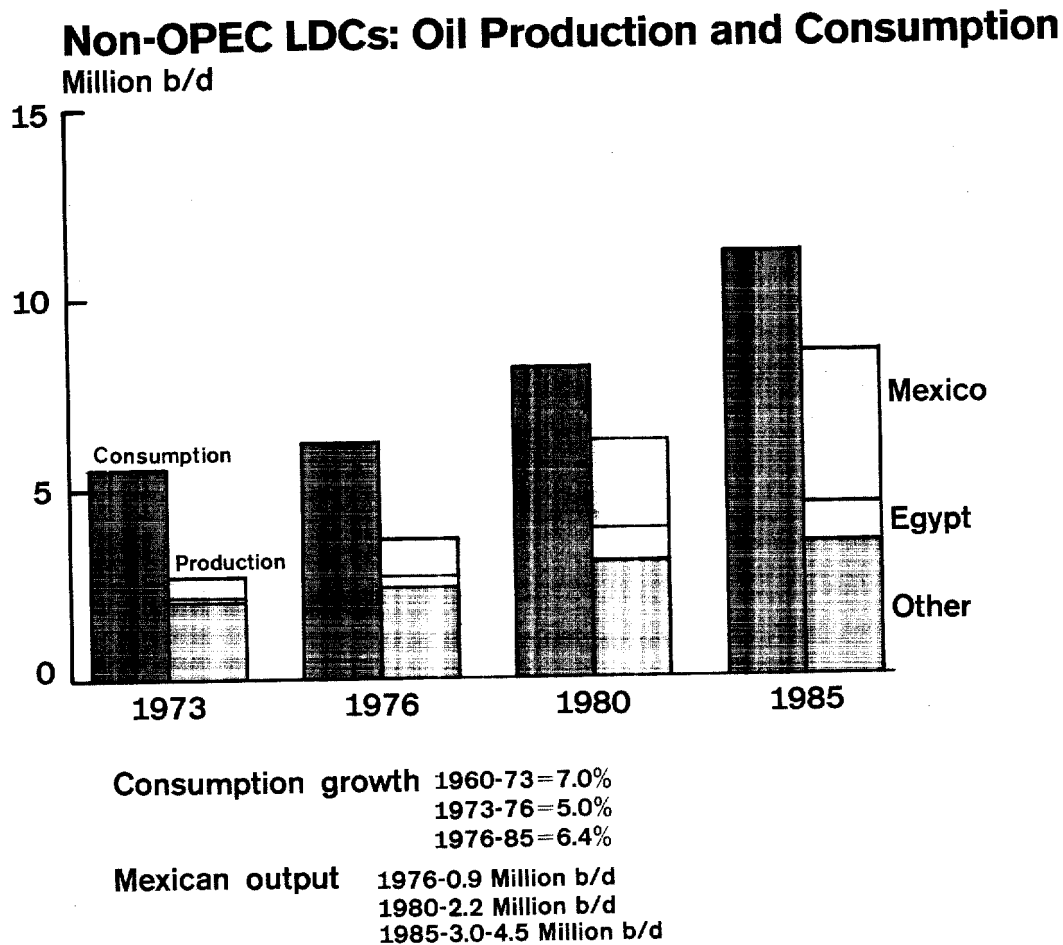
¹ Israel and South Africa.

² Including natural gas liquids.

Role of Communist Countries in the Oil Market

The Communist countries have been net exporters of about 1 million b/d of oil to the West. But the Soviet oil industry is in trouble. Soviet oil production will soon peak, possibly as early as next year and certainly not later than the early 1980s. The

Figure 3



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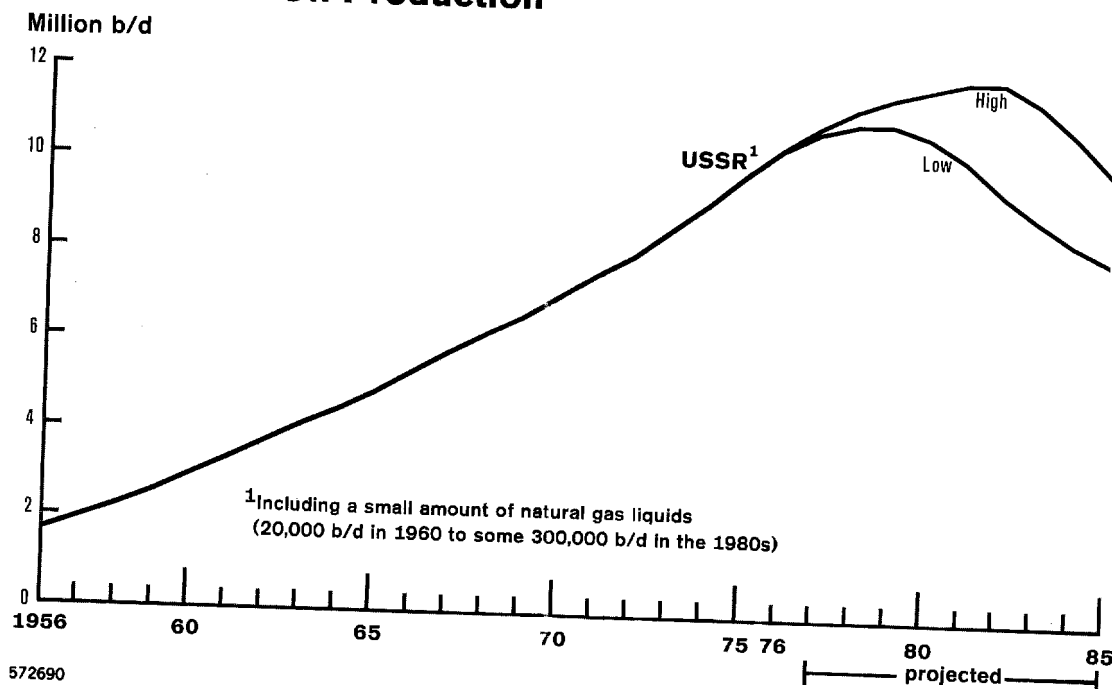
maximum level of output is likely to be between 11 and 12 million b/d—up from the 1976 level of 10 million b/d—but it is not likely to be long maintained, and the decline, when it comes, will be sharp (figure 4).

Before 1985, the USSR probably will find itself not only unable to supply oil to Eastern Europe and the West on the present scale but also having to compete for OPEC oil for its own use. Although there will be some substitution of coal and gas for oil in domestic use, the scale of such substitution will be small before 1985. Neither hydroelectric power transmission from the East nor the construction of nuclear powerplants can afford much relief until well past 1985.

We estimate that the Soviet Union and Eastern Europe will require a minimum of 3.5 million b/d in imported oil by 1985. At worst, slumping production could lead to import requirements as large as 4.5 million b/d.⁵

Soviet Crude Oil Production

Figure 4



In China, the reserve and production outlook is much less favorable than it appeared a few years ago. We anticipate that growing domestic oil needs, resulting from economic growth and trouble with coal production, will reduce oil exports to a negligible level by 1985. In 1980 exports will total no more than 500,000 b/d.

5. For further details on the Soviet oil production outlook, see ER 77-10147, *The Impending Soviet Oil Crisis*, March 1977, [redacted]

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Demand for OPEC Oil

Because of slow development of alternative energy supplies during the past 3 years and a rebound in energy consumption, production of OPEC oil hit a new record last year—34 million b/d by yearend. This topped the previous peak of 33.4 million b/d reached in September 1973. All signs point to OPEC output in 1977 exceeding the 1976 yearly average of 31 million b/d. Rising US import demand (5.8 million b/d in 1975, 7.0 million b/d in 1976, and about 8.5 million b/d in 1977) accounted for about one-half the rise in OPEC output last year and will account for the entire rise in 1977.

The Next Several Years

Because of large-scale production from Alaska and the North Sea, demand for OPEC oil will rise only gradually during the next few years. Under these conditions and assuming continued Saudi restraint on oil pricing, the real price of oil probably will not rise substantially and could even decline. Saudi restraint on pricing, of course, will depend largely on political considerations, including progress toward a Middle East settlement satisfactory to Riyadh. Assuming good political relations with Riyadh, we can expect a period of relative calm on the energy supply front at least through 1979, with real oil prices stable or perhaps declining.

Demand for OPEC oil could total about 32 million b/d this year and will remain at about that level in 1978 and 1979. In 1980 it will jump by another 2 million b/d, beginning a strong upward trend. Alaskan output will have stabilized and growth in North Sea production will be slowing. At about the same time, the Soviet Union probably will be withdrawing as a net supplier of 1 million b/d to the West.

We estimate the 1980 demand for OPEC oil will be about 34 million b/d—2 million b/d more than in 1977. OPEC capacity should be more than adequate. The Saudis have frequently indicated a desire to hold oil production in a roughly defined band of 8 to 10 million b/d. At the same time, they are going ahead with a capacity expansion program which should allow them to produce 15 to 16 million b/d in the early 1980s. Other OPEC countries will be able to produce at or near capacity, and Saudi Arabia, as the residual supplier, can produce within its preferred range. Riyadh, meanwhile, will be in a position to use its excess capacity as a club in efforts to enforce price moderation.

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Beyond 1980

After 1980 demand for OPEC oil will rise rapidly, repeating the pre-1973 pattern. By 1985, we project demand for OPEC oil at a minimum of 47 b/d and a maximum of 51 million b/d. Increased US oil demand will account for a major portion of this rise (table 5). US imports will run some 10 million b/d in 1980 and could reach 12 to 15 million b/d in 1985. West European import demand will

Table 5

Oil Demand and Supply Projections Free World

	Million b/d					
	1976	1977	1978	1979	1980	1985
Free World Oil Demand	48.4	49.8-50.5	51.2-52.2	52.5-54.1	54.9-56.7	68.3-72.6
United States	16.7	17.8-18.3	18.2-19.0	18.4-19.7	19.3-20.7	22.2-25.6
OECD Europe	13.6	13.9-14.3	13.8-14.2	13.7-14.4	13.7-14.7	15.8-18.2
Japan	5.2	5.3-5.4	5.5-5.8	5.9-6.2	6.2-6.6	8.1-8.8
Canada	2.0	2.0-2.1	2.1-2.2	2.2-2.3	2.2-2.4	2.9-3.5
Other developed countries ¹	1.2	1.2	1.3	1.3	1.4	1.9
Non-OPEC LDCs	6.7	7.1	7.5	7.8	8.5	12.0
OPEC countries	2.1	2.3	2.5	2.8	3.0	4.0
Other Demand ²	0.9	0	0	0	0	0
Non-OPEC supply³	17.5	18.5	20.1	21.2	22.0	20.4-22.4
United States	9.7	9.6	10.2	10.2	10.0	10.0-11.0
OECD Europe	0.9	1.8	2.5	3.1	3.7	4.0-5.0
Japan	0	0	0	0	0	0.1
Canada	1.6	1.6	1.5	1.5	1.5	1.3-1.5
Other developed countries ¹	0.5	0.5	0.5	0.5	0.5	0.4
Non-OPEC LDCs	3.7	4.1	4.6	5.3	6.1	8.0-9.0
Net Communist trade						
USSR-Eastern Europe	0.9	0.7	0.5	0.2	-0.3	-3.5 -4.5
China	0.2	0.2	0.3	0.4	0.5	0
Required OPEC production	30.9	31.3-32.0	31.1-32.1	31.3-32.9	32.9-34.7	46.7-51.2

¹ Australia, Israel, New Zealand, and South Africa.

² Including stock changes and statistical discrepancy.

³ Including natural gas liquids.

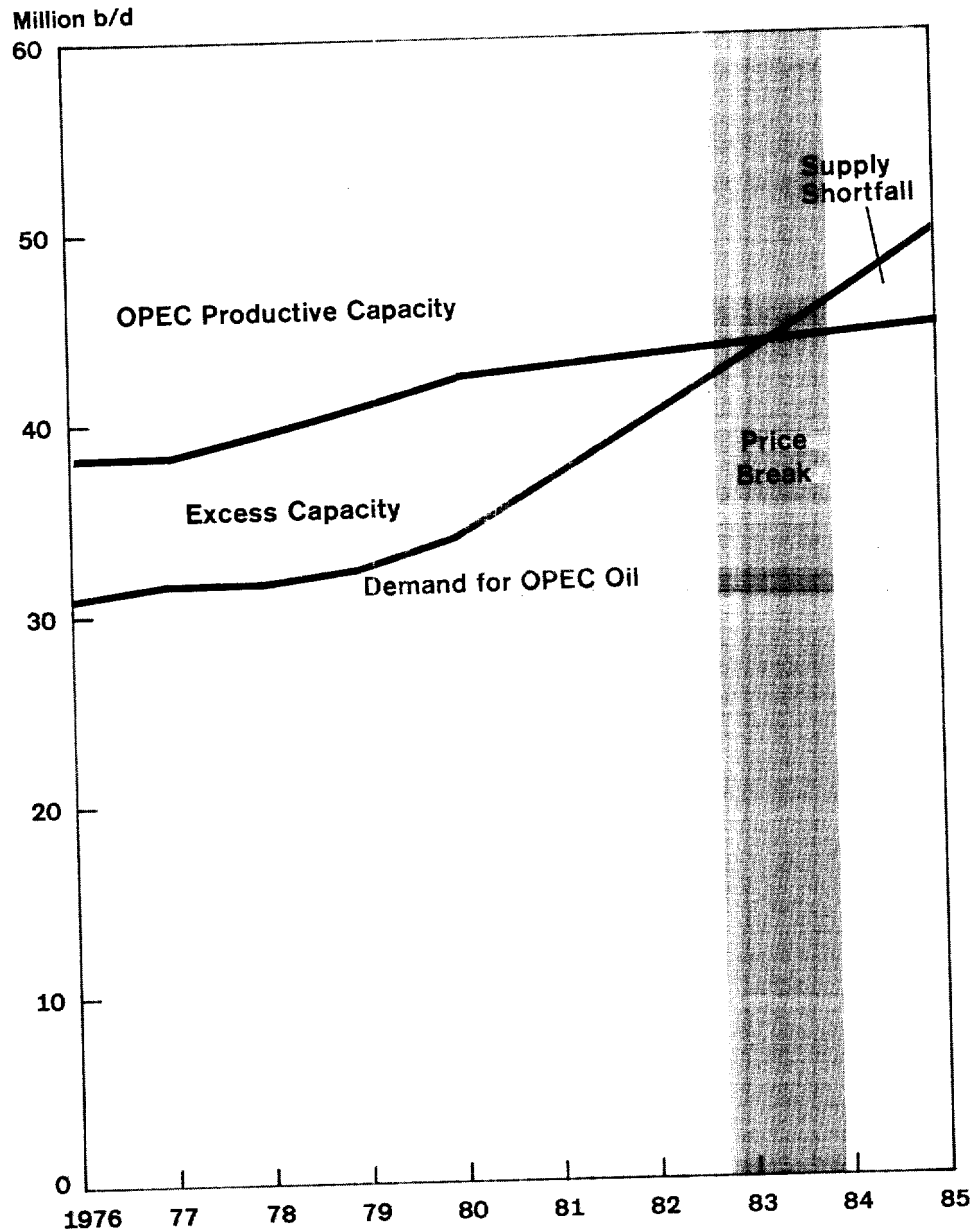
remain relatively stable, going up from about 10.5 million b/d in 1980 to 11 to 14 million b/d in 1985. The increase in net import demand by Communist countries between 1980 and 1985 is on the order of 4 million b/d.

The ability and willingness of OPEC countries to meet this demand is far from certain. As things now stand, we estimate that the productive capacity of OPEC

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Figure 5

OPEC Oil: The Supply/Demand Gap



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countries other than Saudi Arabia will increase little, if at all, between 1980 and 1985 (table 6). On the basis of the current pattern of reserve depletion and development, we estimate their combined oil production capacity will approximate 28 million b/d in 1980, 28.2 million b/d by 1982, and at most 29.4 million b/d in 1985. Our 1985 calculations include capacity estimates for Iraq and Nigeria of 6 million b/d and 3 million b/d, respectively—the highest capacity figures mentioned by industry and government spokesmen. In the case of Kuwait, our 1985 estimate of capacity is consistent with strongly stated government policy.

Table 6

Production Capacity Projections
OPEC Countries (excluding Saudi Arabia)

	Million b/d		
	March 1977	1980	1985
Total	26.8	27.6-28.3	27.5-29.4
Algeria	1.0	1.0	0.9-1.1
Ecuador	0.2	0.2	0.2
Gabon	0.2	0.2	0.2
Indonesia	1.7	1.9-2.1	1.6-2.1
Iran	6.7	6.5	5.5-6.5
Iraq	3.0	4.5	5.0-6.0
Kuwait	3.5	3.0	3.0
Libya	2.5	2.5	2.0-2.5
Nigeria	2.3	2.3	2.0-3.0
Qatar	0.7	0.6	0.5
United Arab Emirates	2.4	2.5-3.2	3.0-3.5
Venezuela	2.6	2.2-2.4	2.2

We expect productive capacity of several of the other OPEC countries to fall after 1980 because of reserve depletion. In the case of Iran, productive capacity is expected to peak in the early to mid-1980s. The best we expect from Iran at this juncture is output of 6.5 million b/d in 1985. We expect Venezuelan output to stagnate near 2.2 million b/d through the mid-1980s, and it may decline. Indonesia and Libya are unlikely to achieve any appreciable gain in productive capacity after 1980.

The Saudi Role

Given our capacity estimates for these OPEC suppliers, Saudi Arabia would have to increase production rapidly beginning in the early 1980s to meet growth in demand. Our projections indicate that demand for Saudi oil could be 7 million b/d in 1980, rising to 12 million b/d in 1982, and to some 13 to 16 million b/d in 1983. Unless demand is somehow curtailed, Saudi Arabia would have to supply 19 to 23 million b/d by 1985. This is roughly double current capacity.

Although the Saudis have the reserves needed to support production at this level, we doubt that an expansion program of this magnitude could be completed by 1985 without a major shift in Saudi priorities. Riyadh is committed to ambitious industrialization programs which are stretching management and logistical capabilities extremely thin. As it is, plans to expand capacity to 16 million b/d by 1980 are at least 2 years behind schedule; if this pattern continues, maximum capacity by 1985 at most would be 18 million b/d.

Even with adequate capacity, the Saudis might well resist pressures to produce at the rates required. Their current preferred production of 10 million b/d would have to be exceeded by 1982. If the Saudis hold production at the high end of their preferred range, the supply shortfall would be about 2 million b/d in 1982, rising to as much as 13 million b/d in 1985. If they stay with present capacity expansion plans (16 million b/d by the early 1980s) and produce at that rate, the supply shortfall—as much as 7 million b/d by 1985—could only be postponed until 1984 at the latest.

How the Saudis will ultimately deal with the problem is difficult to assess. The rates of production needed to satisfy demand would not only generate enormous surpluses—at present prices Saudi Arabia's oil export earnings would approximate \$125 billion annually—but would also risk rapid reserve depletion. Industry sources have estimated that, should Saudi Arabia allow production to reach 20 million b/d by the mid-1980s, output would begin to decline in the mid-1990s because of reserve depletion. Raising production to that level, moreover, could not be accomplished without flaring large quantities of gas, which the Saudis are determined to avoid.

The rising pressure of oil demand on capacity in the early 1980s is bound to cause oil prices to rise well in advance of any actual shortage. Saudi Arabia's ability

to moderate OPEC price decisions will be weakened as Saudi excess capacity is used up. Even before this, market preceptions of supply and demand trends will tend to put upward pressure on prices. By 1982 or 1983, sizable price increases are inevitable unless large-scale conservation measures cut demand sharply.

Comparison With Other Estimates

Oil industry and government forecasters generally agree that demand for OPEC oil will exceed OPEC's ability or willingness to produce by 1985. Most forecasts place demand for OPEC oil in 1985 at 42 to 49 million b/d. Both the International Energy Agency and Federal Energy Administration have concluded that OPEC is unlikely to be willing to produce at such levels. As our demand forecast is even higher, we believe the magnitude of the problem is substantially greater. This primarily reflects our assessment of Soviet oil supply and demand. Other forecasters assume that Communist countries will continue to be net exporters of as much as 1 million b/d in 1985. Given our estimates of Communist country import demand of 3.5 to 4.5 million b/d for OPEC oil in 1985, the Exxon, FEA, OECD, and Levy forecasts would approximate the CIA forecast.

Table 7

The 1985 Oil Outlook Comparative Forecasts

	Million b/d					
	CIA (Apr 77)	Exxon (Mar 77)	IEA/SLT (Mar 77)	FEA (Feb 77) ¹	OECD (Jan 77) ¹	Levy (Sep 76)
Free World oil demand	68.3-72.6	68	NA	71	65.2	NA
Non-OPEC oil supply						
United States/Canada	11.4-12.4	11	NA	13.6	13.0	NA
OECD Europe	4.0-5.0	5	NA	4.0	4.3	NA
Other Free World	8.5-9.5	9	NA	8.2	7.8	NA
Net Communist trade	-3.5 -4.5	1	NA	-0.4	0.8	NA
Required OPEC production	46.7-51.2	42	42-49	45.6	39.3	41.9

¹Reference case.

Comments and queries regarding this memorandum are welcome. They may be directed to [redacted] of the Office of Economic Research, [redacted]

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